appeared in this column last week, gives the right ascension greater by 1° 29′ and the declination further south by 21′; though the Cordoba observation is called a rough one, under the circumstances it will hardly be liable to such errors, and may be at least comparable in accuracy with the approximate positions received from the Royal Observatory at the Cape. If we combine it with the Cape places on February 10 and 15 for the determination of the orbit, the following remarkable elements result—we say remarkable from their being almost identical with the elements of the grand comet of 1843, as will be seen from the orbit annexed:—

	Comet of 1880.		Great comet of 1843 (Hubbard's parabola).
Perihelion passage	Jan. 27·6027		
	° ′		° ′
Longitude of perihelion	279 6·8	...	278 35·1
,, ascending node ...	4 1·9	...	1 20·6
Inclination	35 39·8	...	35 38·2
Log. perihelion distance	7·77371	...	7·74123
Motion	Retrograde	...	Retrograde

If this close resemblance is the result of accident, and the true orbit of the comet more like that published last week, the coincidence is a very unusual one in such computations, and in fact not far from an unique case.

Prof. Hubbard, from his rigorous investigation of the orbit of the great comet of 1843, concluded that the period extended to several centuries, though before the comet was beyond reach of the telescope it was conjectured that the revolution might be comparatively short, and from a similarity in the appearance of the comets of 1668, 1702, and 1843, a period of about thirty-five years was considered probable by many astronomers. Pending the arrival of accurate observations from the southern hemisphere, which may decide the true form of orbit, it may be worth while to examine with large telescopes the vicinity of positions calculated from the orbit which so closely resembles that of the comet of 1843, as, in the event of identity, observations of position made now would have great value. For 8h. Greenwich mean time the above orbit gives the following places:—

		R.A.		N.P.D.		Log. distance from Earth.
		h. m.		° ′		
April 2	...	4 59·6	...	98 22	...	0·2978
4	...	5 3·2	...	97 58	...	0·3104
6	...	5 6·7	...	97 36	...	0.3224
8	...	5 10·0	...	97 15	...	0·3338

PHYSICAL NOTES

M. DUCRETET has made the important observation that "toughened" glass is less easily penetrated by the electric spark than ordinary glass. He proposes to apply this discovery in the manufacture of superior Leyden jars. It is almost needless to point out that a means of making powerful condensers of more compact form is afforded by the employment of the toughened article. The very important bearing of the matter upon the whole question of dielectric strain and the elastic recovery of bodies is a point which will probably receive due attention at the hands of physicists.

THE residual charge of the Leyden jar has been recently investigated afresh by Herr Giese (*Wied. Ann.*, No. 2). It seemed desirable to follow the course of formation of this charge under conditions more amenable to analytical treatment than has hitherto been the case, and to make the phenomenon independent of external influences. This he sought to attain by determining the quantity of electricity which flowed to the coatings when the difference of potential was kept constant. His method is fully detailed in the paper referred to, and the result he is led to is that the formulæ of Riemann (who offered the hypothesis of an antelectric state of matter, at a meeting of scientists in Göttingen in 1854) are not in harmony with experiment.

A PAPER by Prof. Rammelsberg, "On the chemical monography of the mica group," has lately appeared in Wiedemann's *Annalen* (Nos. 1 and 2). As to the kind of relations that exist between the chemical nature of micas and their other properties, he remarks that there are differences in corresponding angles, though the amount can be ascertained only in few cases. Optical differences can be determined with more certainty; in this respect all alkali-micas, whether containing sodium, potassium, or potassium and lithium, are alike. The plane of the optic axes is at right angles to the plane of symmetry. Pure magnesia-micas are the opposite in this respect. Among the iron-magnesia-micas there are some which are optically like the alkali-micas, but more which are like the pure magnesia-micas. In the lithium-iron micas of Zinnwald the axes are as in the last-mentioned micas. The baryta-mica of Sterzing is optically like the alkali-micas. From all this it results that any classification of micas can only be a chemical one. But so long as we do not know whether the (qualitative) chemical nature coincides with the subdivision hitherto adopted (muscovite, phlogopite, biotite, &c.), which however rests only on physical differences, we cannot exchange the certain chemical names with those which are derived from some special physical character, *e.g.*, the position of the plane of the optic axes.

To the scientific applications of centrifugal force which have been made since the time of Musschenbroek, who, in his treatise on Physics, calls attention to the utility of it, Prof. Thury of Geneva (*Arch. de Sci.*, January) thinks the following might be added:—Measurement of the adhesion of liquids and solids; separation, total or partial, of a dissolved body from its solvent; separation of the constituents of alloys (kept in fusion by means of Bunsen burners); separation of liquids of different densities; production of high vacua; modification of crystalline forms (possibly); depolarisation of electrodes in some circumstances of electrolysis; modification of the organisation of embryos in the egg; observation of a body in very rapid circular motion, as if it were motionless.

SIGNOR AGOSTINI finds (*Natura*, 3) that if through a drop of mercury, lying on a surface not wet by it, a current be sent in vertical direction, it rotates under the influence of the earth's magnetism, as may be seen if a few particles of lycopodium powder be strewn on it. Similarly a mercury drop rotates when placed on the surface of a steel magnet, and *e.g.* the magnet connected with the positive pole of a very weak element, while an electrode penetrating the drop from above is connected with the negative. From the strength and direction of rotation of a number of such drops one may in general make visible the distribution of the magnetism, the neutral points, &c., both in the magnetic bars themselves, as when an iron bar is brought coaxially near to one end, or into contact; also in the latter. The results of previous experimental measurements are thus confirmed.

GEOGRAPHICAL NOTES

PROF. NORDENSKJÖLD reached London on Friday last, several days after he was expected, thus upsetting all the arrangements which were made for his reception. He is, we understand, to leave for Paris to-day to receive the Great Gold Medal of the Geographical Society and the distinction of Commander of the Legion of Honour. While here he has been entertained in a quiet way by various distinguished people; among others by the Swedish Minister, the Earl of Northbrook as president of the Geographical Society, Mr. Spottiswoode, president of the Royal Society, Sir Allen Young, and others. Doubtless he will return to London at a time more convenient to give him the public reception which he merits.

IT is stated that Lieut. Bove, who accompanied Nordenskjöld in the *Vega*, has gone to Rome to submit to the King of Italy and the cabinet a plan for an Italian expedition to the South Pole.

A LETTER recently received from Capt. Howgate mentions that, whether aided or not by the (U. S.) Government, he is determined to start an expedition to the Arctic regions this year. The s.s. *Gulnari* is now on the "ways," being fitted up for ice navigation under the superintendence of Capt. Chester, who was with Hall in the *Polaris*. A house of wood—double boarded —21 × 68 feet, modelled after those used by the Hudson's Bay Company, is being constructed for the men to winter in on the shores of Discovery Harbour, and will be ready by April 1. A steam launch will probably form part of the expedition.

THE Japan papers state that the Russian Government have determined to despatch a man-of-war to make a hydrographical survey of the Japanese seas and the Sea of Okhotsk. The Geographical Society of St. Petersburg have been invited to send a representative with the expedition, and it is believed that Prof. Amantevitch will be selected on account of his knowledge of the Japanese language and the dialects spoken on the east coast of Siberia.

MR. G. F. EASTON, the agent of the China Inland Mission at Tsin-chow in the Kansu province, has sent home an account of

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a journey which he made last summer to Si-ning-fu and other almost unknown cities on the north-western frontier of the empire. After leaving the main road he travelled west to Ho-chow, and thence pushed along the border country to Shun-hwa-ting on the bank of the Yellow River, crossing which he moved on to Ba-rung and thence to Si-ning-fu, where he stopped six days, returning by way of Lan-chow-fu. It may be interesting to note that many of the places visited by Mr. Easton are not marked on European maps, though he says they are shown on a Chinese map published in book form at Wu-chang. Near the Yellow River Mr. Easton found himself amongst the Sah-la, who differ little in appearance and habits from the Chinese, though they have an entirely distinct language; he also met a few Tu-ren—usually called the Tu-li tribe—who are also Mohammedans, and within a few miles of Si-ning-fu there are several other tribes. To his surprise, at Si-ning Mr. Easton found Count Bela Szechenyi, Lieut. Kreitner, and Mr. Loczy, of the geological department at the Vienna Museum. Mr. Easton states, presumably on the authority of Count Szechenyi, that the altitude of Si-ning-fu is 8,600 feet, and that of Tsing-hai, or Koko-Nor, 10,500 feet, while Lan-chow is about 5,000 feet above sea-level. The correct position of Si-ning is stated to be 36° 33′ 32″ N. lat., 102° 24′ 35″ E. long. Some Germans had recently arrived at Lan-chow-fu to commence a woollen manufactory there for the Chinese, but Mr. Easton does not speak hopefully of their condition or prospects.

FROM a native Japanese paper we learn that the idea of opening Shimonoseki, on the Inland Sea, to foreigners has been abandoned, and that Nairi, in the province of Buzon, Kiushiu, has been selected as an open port in its place.

DURING his recent journey from the head of Lake Nyassa to Lake Tanganyika, Mr. James Stewart, C.E., who is now permanently attached to the Livingstonia mission of the Free Church of Scotland, visited four different tribes, of whom but little has previously been heard. The first was the Chungu tribe, on the lake-shore and inland up to the head of the Songwe valley; their country is described as good and cattle are numerous; iron, too, is abundant and much worked. This tribe, however, is by no means strong, owing to nearly every village being independent. The next tribe visited was the Anyamauga, whose country extends to the Mera River. To the west of them is Mambwe, under a young and intelligent chief, whose people are industrious ironworkers. In the hills round the south end of Lake Tanganyika are the Akandi tribes, all speaking different dialects. They are much harassed by the Babemba. To the north, near the Fipa Mountains, the people are Basukuma, who are separated from the Anyamauga by the River Saisa. At Lake Hikwa, the name of which has hardly been heard of before the journeys of Messrs. Stewart and Thomson, and the position of which is not at present fully identified, the people are Abanda and Apimbwe, while the Chosi River is the boundary between the Mambwe and Babemba. We are glad to learn that Mr. Stewart promises to send home immediately a map and section of his route, together with additional data, which cannot fail to be of interest from a geographical point of view.

THE French Exploring Expedition for the Trans-Saharan Railway has left Wargla for the interior of Africa.

THE METEOR SHOWER OF JANUARY 2

FROM amongst the extensive number of annually recurring meteoric displays there are few comparable, either in point of richness or brilliancy, with the January meteors. The Leonids, Perseids, and Andromedes severally form showers of greater intensity at the epochs of their periodical returns, and there can be no question that the Perseids, as an annual phenomenon, stand unsurpassed, but with the exception of these special instances, perhaps none of the many streams of shooting stars deserve a higher place than that which heralds the opening of the year. The Lyrids, Orionids, and Geminids are entitled to be considered of equal importance as affording an annual spectacle of much interest, though the former system appears during its last few returns entirely to have lost the splendour which characterised its exhibitions in former years. The January meteors, while thus meriting whatever significance is attached to a shower of the first order, have not, it must be admitted, been observed with half the diligence awarded to some other streams of similar nature. An explanation is probably to be found in the circumstance that it does not become thoroughly well visible until the morning hours. The radiant point situated at 230°·5 + 51·3° (15° following η Ursæ Majoris) in a region comparatively bare of stars, though never below our horizon, is yet, during the first half of the night, at a very low altitude, and thus its operations are limited, though not sufficiently so to cause the apparent extinction of the display. In the early evenings of January, 1879 and 1880, it furnished many fine meteors ascending in long courses from the direction of the northern horizon, and appearing in sufficient numbers to cause remark amongst ordinary persons quite unaware of the progress of a notable star shower.

I have been speaking of this phenomenon as one of annual occurrence, but it is fair to conclude that it also possesses the elements of periodical fluctuations, as in the case of the Leonids and Perseids. Prof. Kirkwood, in a paper read before the American Philosophical Society on November 21, 1873, remarked upon this shower as one giving evidence of recurring brightness. He found, chiefly by the comparison of observations made during the present century, that its principal manifestations took place in the years 1825, 1838, and 1864, from which he inferred a periodic time of thirteen years. This would have indicated a maximum in 1877, but nothing of it was seen, though the shower has been very active since that period. Whether or not the investigations of Prof. Kirkwood have allowed the determination of its periodical maxima is a point to be settled by future observations. The history of the shower, as recorded in past years, is too incomplete to afford the materials for anything like a reliable estimate of the period of its revolution. Many times it has wholly escaped record, and even during its visible returns it is seldom witnessed with success. The state of the sky, the time and manner of observation, all affect the results to a considerable degree, and will often occasion apparent variations in the annual appearances of a shower which have no real existence. And it must be borne in mind that from the indefinite descriptions of former showers, it is sometimes impossible to ascribe a fair weight or to detach actual facts from the wild and often exaggerated notices of such phenomena.

Though no good correspondence has yet been detected between a cometary orbit and the orbit of this stream, it is none the less important that the precise centre of divergence of its meteors should be ascertained. Mr. Greg placed it at 232° + 49° from an average of seven independent observations (see his catalogue of the radiant points and durations of meteor-showers in the B.A. Report, 1876), and found a closely adjoining shower of rather later date, which he regarded as distinct at 225° + 54° for the period January 1 to February 6. The mean of the two is 228°·5 + 51°·5, which presents a singularly near agreement with the centre of the shower as I have recently determined it from all the available observations of the radiant point, which have been compared together as follows:—

Radiant Points of January Meteors.

No.	Epoch.	Radiant.		Observer.
		α	δ	
1.	Dec. 15–Jan. 15	231°	+ 53°	E. Heis.
2.	Jan. 15–31	227	+ 54*	E. Heis.
3.	Jan. 2, 1863	238	+ 46·5	S. Masters.
4.	Jan. 2, 1864	234	+ 51	A. S. Herschel.
5.	Jan. 2, 1867	228	+ 55	Herr Bornitz.
6.	Jan. 29–Feb. 6	223	+ 54*	Greg and Zezioli.
7.	Jan. 2–3	238	+ 45	Greg and Herschel.
8.	Jan. 2–7, 1870	229	+ 51	G. L. Tupman.
9.	Jan. 2–3, 1872	227	+ 49	A. S. Herschel.
10.	Jan. 2, 1872	228	+ 52	T. Crumplen.
11.	Jan. 1–15, 1872	228	+ 53	W. F. Denning. From the Italian Observations.
12.	Jan. 2–3, 1873	234	+ 48	T. W. Backhouse.
13.	Dec. 12 and 21, 1876	221	+ 53*	W. F. Denning.
14.	Jan. 4, 1877	231	+ 54	W. F. Denning.
15.	Jan. 20, 1877	220	+ 52*	W. F. Denning.
16.	Jan. 2, 1878	222	+ 55	A. S. Herschel.
17.	Jan. 2, 1879	230	+ 51	W. F. Denning.
18.	Jan. 2, 1880	228	+ 54	W. F. Denning.
19.	Jan. 2, 1880	232	+ 55	H. Corder.
20.	Jan. 2, 1880	230	+ 48	H. Corder.

Mean position = 229°·0 + 51°·7 from twenty observations, but the four positions distinguished by asterisks are not sufficiently accordant in epoch to be considered as certain displays of the

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